received data packet is intended to alter configuration variables. If it is, a branch at section 520 is taken to FIG. 15 at section 545. In section 546, the configuration variable address is extracted. In section 547, the configuration variable data is written. In section 548, an acknowledgment is issued. An acknowledgment may consist of a motor lurch, a light flash or both. The acknowledgment gives the end user an indication that the programming has been accomplished. The software branches at section 549 back to FIG. 11 at section 514 to begin receiving a new preamble.

It should be understood that various changes and modifications to the presently preferred embodiments described herein will be apparent to those skilled in the art. Such changes and modifications may be made without departing from the spirit and scope of the present invention and without diminishing its attendant advantages. It is, therefore, intended that such changes and modifications be covered by the appended claims.

We claim:

1. A sound reproducing system for a model train traveling on a plurality of rails that uses a amplified digital control signal for propulsion and control, the system comprising:

a sound memory storing a plurality of sound effects at predetermined addresses;

a controller connected to the sound memory for recalling the sound effects of either one or a plurality of sound effects in a predetermined sequence or a random sequence;

a sound memory containing multiple samples that emulate a model locomotive at various speeds and work loads;

an integrated sound, motor and special effects controller controlled by a bi-polar digital signal, the motor and special effects controller re-producing the stored sounds contained in the model train; and

a digital packet triggering a sound effect for automatic playback of a sound effect.

2. The system according to claim 1 wherein the model train has two rails for providing a digital signal and powering the sound effects of the model train, motor, and special effects system.

3. The system according to claim 1 further comprising:

an electrical power supply in the rail car or track side structure having a means for collecting the digital bi-polar signal from either of the two insulated tracks by a pick up on two insulated wheels or off of a digital buss line or overhead wire;

a full wave bridge rectifier with an input connected to a bi-polar digital signal with an output producing a DC voltage regardless of the phase of the bi-polar signal;

a regulated power supply connected to a full wave bridge rectifier supplying power to the sound reproducing system; and

a regulated power source for the audio amplifiers.

4. The system according to claim 1 further comprising:

means for simultaneously decoding a properly addressed digital control packet for control of the model locomotive's electric motor, control of the sound functions and on board special effects.

5. The system of claim 1 further comprising the steps of:

a fixed external source of either AC or DC power and means for connecting a bi-polar digital signal to the sound unit;

means for filtering the low level signal noise in the reception of the bi-polar digital signal for power and control of the sound unit.

Sub E1 > Insert E2 >

(23)

6. The system of claim 1 further comprising:

means to synchronize sound effects through the use of a Hall effect sensor to trigger a plurality of speed sensitive sounds located in a model train locomotive or rail car based on a digital speed packet wherein the speed sensitive sounds are stored in the memory and include various samples that emulate different speeds and loads;

a controller that recalls the same plurality of synchronized sound effects at intervals appropriate to the speed of the locomotive depending on a digital command control speed packet wherein the same controller recalls a plurality of synchronized sound effects at intervals appropriate to the speed of the locomotive using a speed sync sensor and further wherein the controller recalls asynchronous sound effects from the same memory or from additional memories for sound on sound.

7. The system of claim 1 wherein the controller activates an automatic steam release sound effect upon sensing a zero speed packet with the correct address header and further activates an appropriate air compressor sound effect upon sensing the same zero speed packet and correct address header and still further activates lighting effects or other onboard special effects after receiving and decoding the properly addressed digital control packet.

8. The system of claim 1 further comprising:

a controller that will decode a three byte packet with an addressed header that matches the sound unit's discreet address in the range of 1 to 127 addresses for controlling a model train locomotive motor, sound effects and onboard special effects.

9. The system of claim 1 further comprising:

a controller that decodes a four byte packet with an address header that matches the sound units discreet address in the address range of 1 through 9999 for controlling a model train locomotive motor, sound effects and onboard special effects.

10. The system of claim 1 further comprising:

means for synchronizing the sound effects to the driver's wheels through decoding a properly addressed digital speed packet that controls the speed of the model locomotive and determines which sound effect to synchronize with the speed of the locomotive using the same digital speed packet.

11. The system of claim 1 further comprising:

a Hall effect sensor to sense a change of speed of wheels of a steam locomotive to trigger the proper speed sound

effect by mounting a magnet to the rear of a drive wheel to form a switch closure for synchronization of the sound effect to the digital speed control packet.

12. The system of claim 1 further comprising:

a micro-controller that decodes a predetermined addressed digital signal for control of sound effects, model train propulsion and on board special effects wherein the micro-controller is operatively connected to the analog sound storage of the sound effects wherein the analog sound storage has a predetermined set of sounds at specific addresses; and

a controller that is connected to special effects outputs that control lighting and other onboard effects.

13. The system of claim 12 wherein the micro-controller controls the volume of the plurality of sound effects contained in a rail car.

14. The system of claim 12 wherein the micro-controller is configured for changing the break points to control a plurality of sound effects as related to the speed of a model locomotive, using either 14, 28 or 128 steps of speed control resolution using control variables.

15. The system of claim 12 further comprising:

means for changing the break points at which the digital speed packet triggers the related sound effects through end user accessible software on the micro-controller or as defined as configuration variables.

16. The system of claim 1 further comprising:

a plurality of digitized sounds that are controlled by the controller that receives a bi-polar digital signal.

17. The system of claim 1 wherein the enabling means is an internally triggered Hall-effect sensor responding to a change in a magnetic field.

18. The system of claim 1 further comprising:

a magnet; and

a pendulum on which the magnet is suspended wherein motion causes the magnet to transpose resulting in a change in the magnetic field.

19. The system of claim 1 further comprising:

a microphone constructed and arranged to record the at least one additional characteristic sound on the sound module means.

20. The system of claim 1 wherein the activation means is a magnetically responsive sensor constructed and arranged near a magnetic field, the magnetic field altered by a magnet.

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